



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/302,687	04/29/1999	DAVID I DIETZ	9076/102	7243

7590 01/20/2004

ROGER A. HEPPERMAN
MARSHALL, GERSTEIN & BORUN
6300 SEARS TOWER
233 SOUTH WACKER DRIVE
CHICAGO, IL 60606-6402

EXAMINER

ALI, SYED J

ART UNIT	PAPER NUMBER
----------	--------------

2127

18

DATE MAILED: 01/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/302,687

Applicant(s)

DIETZ ET AL.

Examiner

Syed J Ali

Art Unit

2127

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 2, 2003 has been entered.
2. This office action is in response to Amendment C, paper number 16, which was filed December 2, 2003. Claims 1-17 are presented for examination.
3. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

Claim Rejections - 35 USC § 102

4. Claims 1-8, 12-14, and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Coronel et al. (USPN 6,363,294) (hereinafter Coronel).

As per claim 1, Coronel discloses an event historian for batch processing comprising:
a history executive element for receiving process event information (col. 8 lines 21-45, "At the end of that step, the key process parameters, the evolution of the selected process parameters during this step and the alert code [if any] are stored in the database") and batch procedure event information (col. 8 lines 21-45, "The wafer history is thus the essential element

Art Unit: 2127

for this update. The sum of the 'wafer history' of all the wafers of a batch constitutes the 'batch history'") from multiple input sources operating in different physical elements of a process and for automatically deriving relationships among portions of said process event information and batch procedure event information based on generated event messages (col. 8 lines 21-45, "In turn, the 'batch history' of a plurality of batches can be exploited, in particular for statistics purposes, for instance for preventive/predictive maintenance", wherein the batch statistics can be compared to ongoing production, and the history as well as alert codes are generated in response to error conditions or other conditions that require action);

a storage element coupled to said executive element for persistently storing said process event information and said batch procedure event information and said derived relationships in response to requests from said history executive element (col. 13 lines 19-62, "Database 46 thus includes...the evolution of the selected process parameters in normal operating conditions and in the identified deviations thereof", wherein the database stores information relating to the current wafer and its batch, as well as previous batch information for statistical analysis procedures); and

an event information retrieval element for retrieving said process event information and said batch procedure event information in accordance with said derived relationships in response to requests from an application process (col. 9 line 63 – col. 10 line 46, "Supervisor 35 includes an internal database, however it should be understood that an external database could be used instead", wherein the supervisor retrieves information from the database pertaining to a specific batch or wafer).

As per claim 2, Coronel discloses the event historian of claim 1 further comprising:

a continuous data collection element for gathering continuous data in real time wherein said continuous data relates to at least one procedural element of a batch process (col. 9 line 63 – col. 10 line 46, “Measurement results are transmitted in real-time to supervisor 35”).

As per claim 3, Coronel discloses the event historian of claim 2 wherein said information retrieval element further comprises:

a batch historian view client application for graphically presenting to a user said batch procedure event information and said relationships and said continuous data (Figs. 8-13, wherein plots of various measurements taken in real-time are presented to the user, and these plots could be changed to monitor any specific signal or combination of signals).

As per claim 4, Coronel discloses the event historian of claim 1 wherein said information retrieval element further comprises:

a batch historian view client application for graphically presenting to a user said batch procedure event information and said relationships (Figs. 8-13, wherein plots of various measurements taken in real-time are presented to the user, and these plots could be changed to monitor any specific signal or combination of signals).

As per claim 5, Coronel discloses the event historian of claim 1 further comprising:

a batch event generator coupled to said history executive element as a first input source wherein said batch event generator generates events indicative of execution of procedural elements of a batch process (Fig. 7, element 17”, wherein the measurement unit creates alarm

Art Unit: 2127

signals that indicate if an error in the batch process has occurred, thereby generating events to the supervisor indicative of any sort of failure of the process); and

a process event generator coupled to said history executive element as a second input source wherein said process event generator generates events indicative of procedural elements performed within equipment used in the control of said batch process (Fig. 7 elements 14-1 and 14-2, wherein the end point controllers depicted monitor the execution process and take measurements as the process continues procedurally, indicated by the various steps in elements 11-1 and 11-2 of Fig. 7).

As per claim 6, Coronel discloses the event historian of claim 5 further comprising:

a continuous data collection element for gathering continuous data in real time wherein said continuous data relates to at least one procedural element of a batch process (col. 9 line 63 – col. 10 line 46, “Measurement results are transmitted in real-time to supervisor 35”), wherein said process event generator comprises:

an event log generated by said continuous data collection element (col. 13 lines 19-62, “Database 46 thus includes...the evolution of the selected process parameters in normal operating conditions and in the identified deviations thereof, the analysis rules with their associated rejection criteria...and finally, the alert codes and the actions to be undertaken that are assigned to each deviation”).

As per claim 7, Coronel discloses the event historian of claim 6 wherein said history executive element includes:

Art Unit: 2127

a history correlation element for relating said batch events and said process events and said continuous data (col. 10 line 49 – col. 11 line 16, “for each potential cause of wafer rejection based on expert information, the same process parameters...are monitored to understand their drifts with respect to the reference evolution mentioned above”, wherein there is stored within the database a component referred to as “batch statistics” that is used to analyze the relationship between the measurement data and previous established criteria).

As per claim 8, Coronel discloses in a batch processing system, a batch history view client application comprising:

means for retrieving batch procedure event information and process event information from multiple sources operating in different physical elements of a process corresponding to an identified batch (Fig. 7 elements 17'-1, 17'-2, and 17'', wherein the measurement units monitor the production of a wafer at various points in its production; col. 8 lines 21-45, “The wafer history is thus the essential element for this update. The sum of the ‘wafer history’ of all the wafers of a batch constitutes the ‘batch history’”); and

means for visually presenting to a user said batch procedure event information and process event information and automatically deriving relationships among portions of said batch procedure event information and process event information (Figs. 8-13, wherein plots of various measurements taken in real-time are presented to the user, and these plots could be changed to monitor any specific signal or combination of signals; col. 8 lines 21-45, “In turn, the ‘batch history’ of a plurality of batches can be exploited, in particular for statistics purposes, for instance for preventive/predictive maintenance”, wherein the batch statistics can be compared to

Art Unit: 2127

ongoing production, and the history as well as alert codes are generated in response to error conditions or other conditions that require action).

As per claim 12, Coronel discloses the view client of claim 8 further comprising:

means for retrieving other batch procedure event information corresponding to a second identified batch (col. 10 line 50 – col. 11 line 16, “For each step, the process parameters that are determining for the monitoring of this step are selected. They are monitored to establish the set of correct process data, corresponding to the normal situation”, wherein the second identified batch is identified as the “normal situation” and is used for comparing the current production parameters of the corresponding step); and

means for presenting to a user said other batch procedure event information and relationships among portions of said other batch procedure event information wherein said means for presenting said other batch procedure event information includes:

means for indicating differences between said batch procedure event information and said other batch procedure event information (col. 10 line 50 – col. 11 line 16, “for each potential cause of wafer rejection based on expert information, the same process parameters...are monitored to understand their drifts with respect to the reference evolution”, wherein the deviations from the normal situation is indicated by alarm signals as potential causes of rejection of that batch, and the batch statistics are used for comparing the specific wafer or wafer batch to previously produced batched).

As per claim 13, Coronel discloses the view client of claim 12 wherein said other batch procedure event information represents processing of a golden batch for comparison with other batches represented by said batch procedure event information (col. 10 line 50 – col. 11 line 16, “For each step, the process parameters that are determining for the monitoring of this step are selected. They are monitored to establish the set of correct process data, corresponding to the normal situation”, wherein the normal situation is analogous to a golden batch, in that it is a batch that is known to be fully functional).

As per claim 14, Coronel discloses the view client of claim 12 wherein said means for visually presenting includes means for presenting said batch procedure event information and said relationships in real time as said batch procedure event information is generated (Figs. 8-13, wherein data points are updated on the chart as they occur in real-time for the purpose of supervising the production).

As per claim 16, Coronel discloses the view client of claim 14 further comprising:

continuous data collection means for gathering continuous data in real time (Fig. 7 elements 17'-1, 17'-2, 17", wherein the measurement units relay data to the supervisor in real time), wherein said continuous data relates to at least one data point of a batch process (Fig. 8, wherein batch statistics or wafer statistics are used to compare data at a specific point, and the sum total of the data comprises at least one point), wherein said means for presenting said batch procedure event information in real time includes means for presenting said continuous data in

real time as said continuous data is gathered (Figs. 8-13, wherein the data charts present the collected data in real time in comparison to normal conditions).

Claim Rejections - 35 USC § 103

5. Claims 9, 15, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coronel in view of Hohkibara et al. (USPN 6,438,436) (hereinafter Hohkibara).

As per claim 9, Hohkibara discloses the following limitations not shown by Coronel, specifically the view client of claim 8 wherein said means for visually presenting further comprises:

means for presenting said batch procedure event information and process event information and said derived relationships as a Gantt chart wherein said Gantt chart is representative of procedural elements of the batch procedure (col. 7 lines 44-52, "The result of the short-range production scheduling is generated as a scheduled work list for each machine. The work list is in the form of a Gantt chart").

It would have been obvious to one of ordinary skill in the art to combine Coronel with Hohkibara since the Gantt chart of Hohkibara enables the operator to monitor various production stages of a wafer (see Fig. 11). Furthermore, the batch process can be broken up into process steps, each of which can be monitored individually. While it is noted that Hohkibara does not disclose displaying derived relationships between process events and the relative batch procedures, Coronel makes up for these limitations. Specifically, Coronel discloses displaying these relationships within a time relative scale to a user, but does not seek to implement the

Art Unit: 2127

display within a Gantt chart. Using a Gantt chart, as in Hohkibara, allows multiple process steps to be monitored simultaneously, while the production time of all wafers and batches would be available from the supervisor of Coronel. Thus, the combination of Coronel and Hohkibara would provide an improved method of displaying batch process event information to a user and allowing a user to manipulate that data.

As per claim 15, Hohkibara discloses the view client of claim 14 wherein said means for presenting said batch procedure event information in real time includes means for scrolling said batch procedure event information horizontally across a user display screen (col. 8 lines 1-12, "The chart on the screen may be scrolled up and down, and to the left and right, by clicking a selected one of buttons denoted by '↑', '↓', '←', '→', which are surrounded by a rectangle located in a bottom part of the screen, so as to scroll the machine names and the time").

It would have been obvious to one of ordinary skill in the art to combine Coronel with Hohkibara for reasons discussed above in reference to claim 9.

As per claim 17, Hohkibara discloses the view client of claim 16 wherein said means for presenting said continuous data in real time includes means for scrolling said continuous data horizontally across a user display screen (col. 8 lines 1-12, "The chart on the screen may be scrolled up and down, and to the left and right, by clicking a selected one of buttons denoted by '↑', '↓', '←', '→', which are surrounded by a rectangle located in a bottom part of the screen, so as to scroll the machine names and the time").

Art Unit: 2127

It would have been obvious to one of ordinary skill in the art to combine Coronel with Hohkibara for reasons discussed above in reference to claim 9.

6. Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coronel in view of Hohkibara in view of Cartsonis et al. (USPN 6,584,501) (hereinafter Cartsonis).

As per claim 10, Cartsonis discloses the following limitations not shown by the modified Coronel, specifically the view client of claim 9 wherein said means for presenting said batch procedure event information and process event information and said derived relationships as a Gantt chart further comprises:

means for presenting said Gantt chart in an absolute time (col. 1 line 59 - col. 2 line 9, “The user interface comprises a time axis listing a plurality of times. These times may be listed in any useful time format, whether absolute or relative time [with respect to some arbitrary starting time]”).

It would have been obvious to one of ordinary skill in the art to combine the modified Coronel with Cartsonis since the modification of the chart of Hohkibara to allow the user to specify a relative time or absolute time allows greater management capabilities and troubleshooting possibilities. Specifically, for an ongoing process it may be desirable to display the Gantt chart in an absolute time scale, such that the current process can be monitored for deviations from a typical batch and corrections can be made on the fly. Contrarily, by way of example, a completed process that produces defective wafers could be retroactively studied to determine at what point a batch deviated from what was expected relative to a known good

Art Unit: 2127

batch. It is noted that the charting mechanism of Cartsonis is related to monitoring threads in a network environment, as opposed to a batch procedure, as claimed. However, Coronel and Hohkibara disclose the monitoring of batch processes and relating the data corresponding to those productions in a Gantt chart. The functionality of a chart is not restricted to the process it is monitoring, and thus Cartsonis is combinable with the modified Coronel.

As per claim 11, Cartsonis discloses the view client of claim 9 wherein said means for presenting said batch procedure event information and process event information and said derived relationships as a Gantt chart further comprises:

means for presenting said Gantt chart in a relative time scale (col. 1 line 59 - col. 2 line 9, "The user interface comprises a time axis listing a plurality of times. These times may be listed in any useful time format, whether absolute or relative time [with respect to some arbitrary starting time]").

It would have been obvious to one of ordinary skill in the art to combine the modified Coronel with Cartsonis for reasons discussed above in reference to claim 10.

Response to Arguments

7. Applicant's arguments filed December 2, 2003 have been fully considered but they are not persuasive.

8. Applicant argues on page 8, "*Coronel et al. does not disclose or suggest an event historian that receives both process event information and batch procedure event information*

Art Unit: 2127

and that then automatically derives relationships among the portions of the received information based on generated event messages. Moreover, Coronel et al. does not disclose that it would be desirable or even possible to derive relationships between these two types of information, much less to present such relationships, along with the event information, in a logical format to the user.”

Examiner respectfully disagrees. Coronel does in fact disclose receiving both process event information and batch procedure event information. Specifically, a batch production of wafers is monitored throughout the production process. If at any point, the process of production deviates from what is considered normal, the supervisor generates an alert code to the computer controlling the process, which then takes the appropriate action. Simultaneously, information relating to this alert code is stored in the database. Thus, the production history of a single wafer is maintained in the database. However, the production of a single wafer is only one component of a batch of wafers. Since information pertaining to each wafer is maintained, the information pertaining to a batch of wafers is also maintained in the database. Furthermore, as the number of batches monitored accumulates, the batch procedure history is built, and is used for statistical analysis for preventing error conditions from arising as well as predicting results based on that statistical analysis. The comparison of ongoing production to the historical batch history of a process continually relates the received information, including alert codes, i.e. event information, to normal or expected conditions. Additionally, Coronel discloses a charting mechanism for relaying the batch process information to a user (Fig. 8-13).

Furthermore, in reference to the limitation concerning **“automatic derivation of relationships among the portions of the received information based on generated event**

messages", Coronel discloses this by way of an analysis algorithm stored within the database that continually monitors the process parameters and the signals generated by the end-point-detection (EPD) controllers that monitor the production process, which in turn determines if an error has occurred in the process (col. 13 line 64 - col. 14 line 55, "the supervisor starts the analysis of the selected process parameters by applying the adequate algorithms stored in the database to analyze the corresponding signals generated by the EPD controller according to the analysis rules stored in the database [step 52]. As a result, the evolution of the selected process parameters is permanently analyzed. Upon occurrence of any selected process parameter drift, the supervisor 35 tests if any of the rejection criteria set up by the process engineers is met [step 53]. It is the role of the analysis algorithms to recognize any identified deviation to the normal process").

9. Applicant's arguments on pages 9-10 with respect to Itoh et al. have been considered but are moot in view of the new grounds of rejection.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (703) 305-8106. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

Art Unit: 2127

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (703) 305-9678. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.



Syed Ali
December 23, 2003



MENG-AL T. AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100